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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/690,217	10/21/2003	George G. Barclay	51821	2341

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EXAMINER

LEE, SIN J

ART UNIT	PAPER NUMBER
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1752

DATE MAILED: 08/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/690,217	Applicant(s) BARCLAY ET AL.	
	Examiner Sin J. Lee	Art Unit 1752	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 June 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,5,9,10,12,15-17,20-22,30,37-42 and 60 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,5,9,10,12,15-17,20-22,30,37-42 and 60 is/are rejected.
- 7) ☒ Claim(s) 22 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

RD

DETAILED ACTION

1. In view of the declaration under 37 CFR 1.132 submitted by applicants, previous 102(e) rejection on claims 1, 5, 9, 10, 12, 15, 17, 21, 22, 30 and 37-42 over Barclay et al'286 is hereby withdrawn.

Claim Objections

2. Claim 22 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

In claim 22, applicants recite that the photoimageable composition of claim 1 (which is positive-acting) is a negative acting photoresist, and thus present claim 22 fails to further limit the subject matter of present claim 1.

3. Due to new grounds of rejections, the following rejections are made non-final.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1, 5, 9, 10, 12, 15-17, 20-22, 30, 37-42 and 60 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. In claim 1, applicants recite that the ratio

of silanol groups to Si atoms is 0.01 to 1.5. When silanol is a hydroxyl group which is directly attached to a silicon atom, how can one have the present ratio of silanol groups to Si atoms greater than 1? That is, how can one have *more* silanol groups than the *total number* of Si atoms in the polymer?

Appropriate correction or clarification is required.

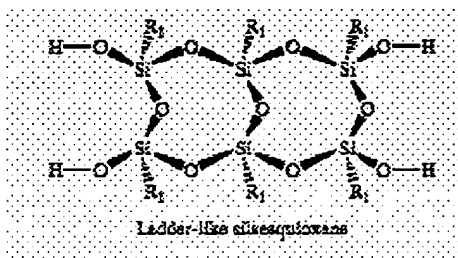
Claim Rejections - 35 USC § 102

6. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

7. Claims 1, 9, 16, 17, 20, 21, 30, 37-42, and 60 are rejected under 35 U.S.C. 102(e) as being anticipated by Barclay et al (US 2003/0219676 A1)

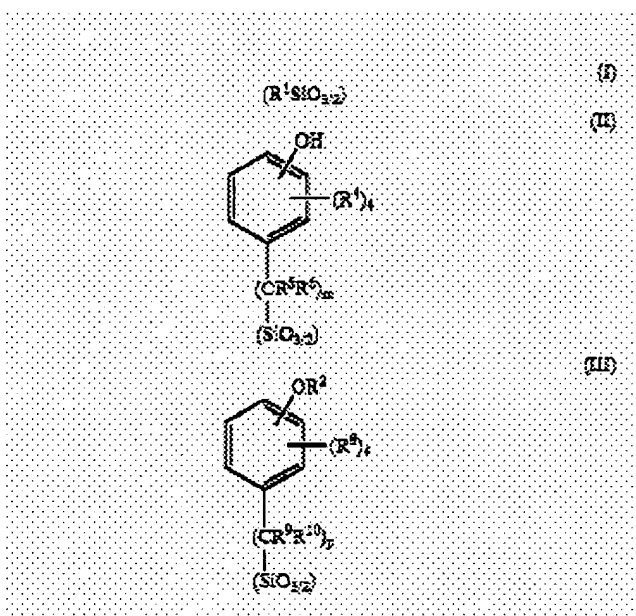
The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Barclay shows a scheme (Scheme II) which depicts a preferred polymerization method for making his siloxane polymer (which is to be used a photoresist resin component) (see [0009] and [0032]). In that scheme, the final product is ladder-like silsesquioxane shown below.



In this structure, the ratio of silanol groups to Si atoms is about 0.7.

Furthermore, Barclay teaches ([0054]) that a preferred polymer for his invention includes one or more repeating unit of formula I, one or more repeating unit of formula II, and one or more repeating unit of formula III, which are shown below



In this polymer, R^1 , which examples are shown in [0055], is neither photoacid-labile group nor aqueous base-solubilizing group. The $-OH$ group in the formula (II) is an aqueous base-solubilizing group. The R^2 group in formula (III) is an acid labile group (see [0055]). Barclay also teaches the use of a photoacid generator together with his

polymer to form a positive photoimageable composition (see [0060] and [0015]).

Therefore, the prior art teaches present inventions of claims 1, 9, 16, 17, 20, and 21.

Barclay uses his photoimageable composition in a top layer in a bilayer photoresist system (see [0087]-[0090]). In such a system, a bottom layer of a conventional photoresist, such as novolac polymer based resist, is applied to a substrate (such as a silicon wafer – see [0113]). After forming the top layer made of his photoimageable composition, Barclay carries out an exposure step using exposure wavelengths, such as 248, 193, and 157 nm. Following exposure, the top layer film is developed to form an etch pattern. Therefore, the prior art teaches present inventions of claims 30, 37-42 and 60.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

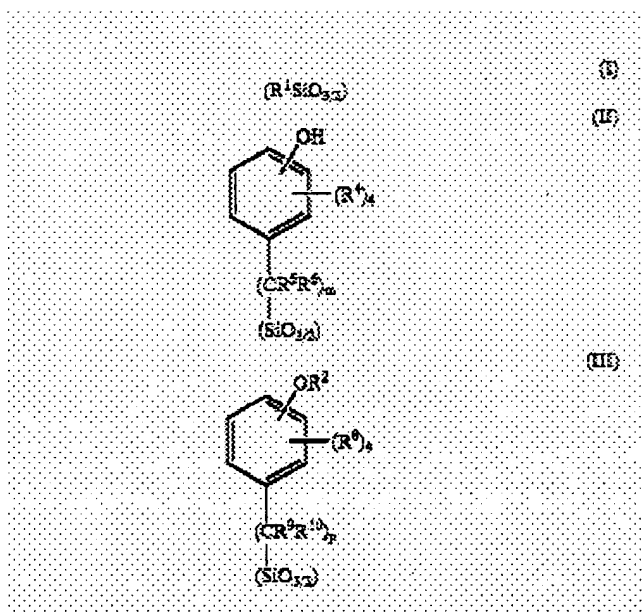
9. Claims 12 and 15 are rejected under 35 U.S.C. 103(a) as being obvious over Barclay et al (US 2003/0219676 A1).

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an

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invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(I)(1) and § 706.02(I)(2).

As discussed above in Paragraph 7, Barclay teaches that a preferred polymer for his invention includes one or more repeating unit of formula I, one or more repeating unit of formula II, and one or more repeating unit of formula III, which are shown below



Furthermore in [0057], Barclay states the following:

[0057] In general, the monomers of formulae I-III may be polymerized in any ratio to provide the polymers of the present invention. For example, monomers of formulae I and II may be used in any ratio of 1:11 from 99:1 to 1:99. Monomers of formulae I and III may be used in any ratio from 1:111 from 99:1 to 1:99. When the present polymers are used in positive-acting photoimageable compositions, it is preferred that the monomers of formula III are present from 5 to 80%, based on the total molar percent of the monomers used.

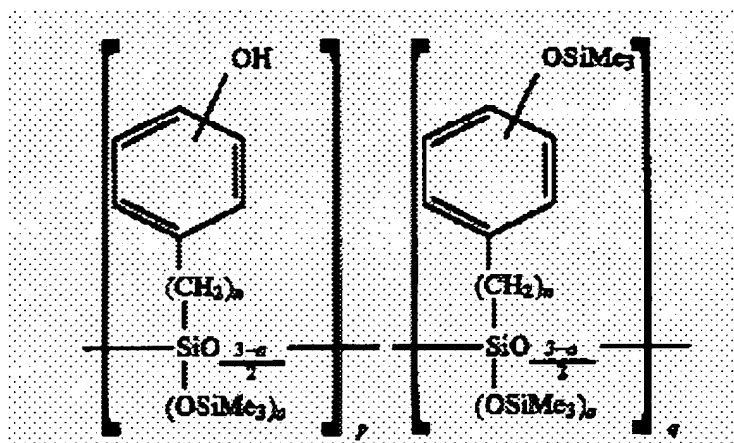
Based on this teaching, it would have been obvious to one skilled in the art to have the repeating unit (III) in the amount of 5% (because "5" is clearly included as the lower end of the taught range), which gives 95% for the sum of (I) and (II). Also, since Barclay teaches that the monomer units of formulae I and II can be used in the ratio of 1:99, it would have been obvious to one skilled in the art to have the ratio of the repeating unit (I) to the repeating unit (II) (the sum of repeating units (I) and (II) being 95 mol%) to be 1:99 (which clearly gives at least 50 mol% for the repeating unit (II)) with a reasonable expectation of obtaining a highly resolved relief image. Thus, Barclay's teaching renders obvious present inventions of claims 12 and 15.

10. Claims 1, 5, 9, 12, 15-17, 21, 30, 37-42 and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takemura et al (5,731,126).

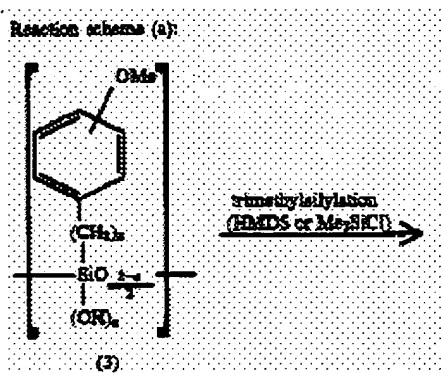
Takemura teaches a chemically amplified positive resist composition comprising a specific polysiloxane having a terminal silanol group protected with a trimethylsilyl group (an acid labile group) and a photoacid generator (see abstract).

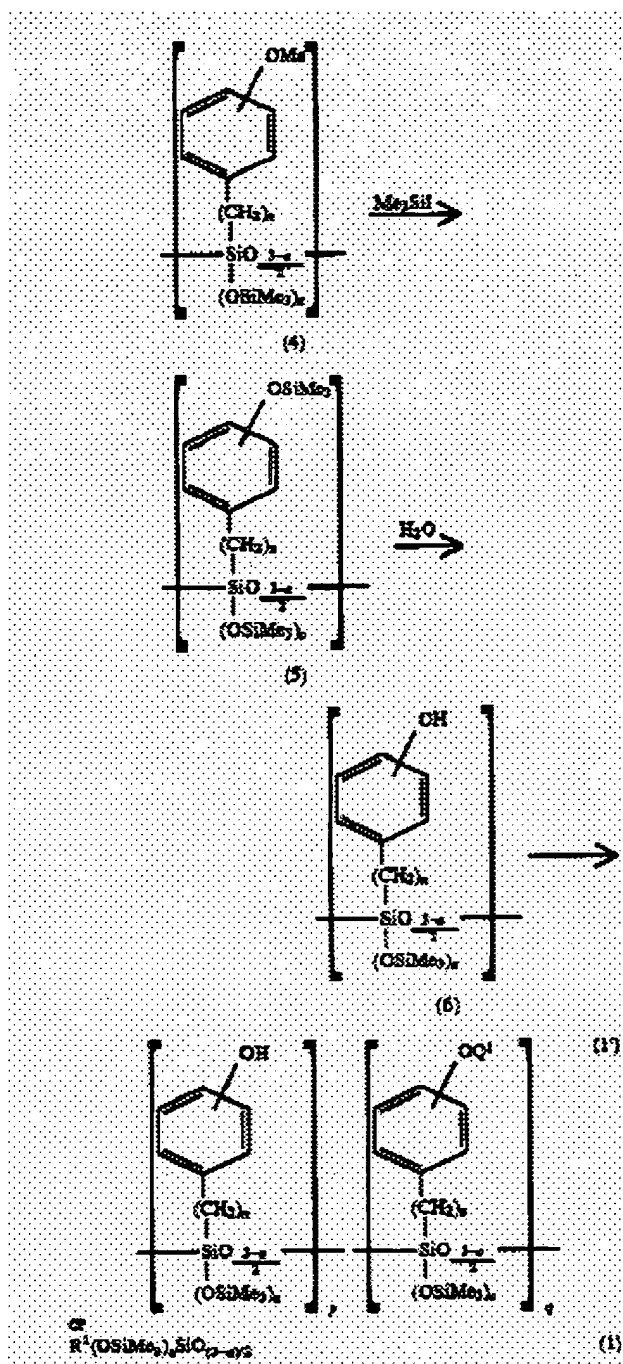
Takemura's polysiloxane (A) is shown below (see col.9, lines 23-35)

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, and the reaction scheme for making such polysiloxane is shown below (see col.10, lines 54-67, col.11, lines 1-53)





Takemura teaches (col.10, lines 16-20) that by reacting the polysiloxane (3) shown above (which has the terminal silanol groups) with trimethylsilyl chloride or

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hexamethyldisilazane to protect the silanol group at the end of its backbone, there can be eventually obtained a polysiloxane having a minimal number of residual silanol groups. Takemura states that the number of residual silanol groups is significantly reduced by his method (see col.6, lines 33-38). Although Takemura does not expressly teach present ratio of silanol groups to silicon atoms, it is the Examiner's position that the ratio of the residual silanol groups to silicon atoms in Takemura's polysiloxane would *overlap at least with the lower side* of the present range (Takemura does not say that the residual silanol groups are completely eliminated. Also, present specification states that present invention brings improved resolution, and Takemura also states that a chemically amplified positive resist composition containing his polysiloxane (with the reduced amount of residual silanol) has high resolution – see col.3, lines 23-26. It has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980)). Therefore, it is the Examiner's position that Takemura's teaching renders obvious present inventions of claims 1, 5, 9, 16, 17, and 21.

With respect to present claims 12 and 15, Takemura teaches(col.9, lines 37-38) that $q/(p+q)$ is preferably 0.1 to 0.3 which gives p to be 0.7-0.9 (70-90 mol%). Therefore, Takemura's teaching renders obvious present inventions of claims 12 and 15.

Takemura forms a thick layer of organic polymer (such as a novolak resin) on a silicon substrate as a lower resist film. Takemura coats his inventive resist composition onto the lower resist film, The coated resist composition film is exposed to a deep UV

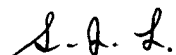
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radiation and then developed to obtain a positive resist pattern on the lower resist film (see col.21, lines 24-40). Thus, Takemura's teaching renders obvious present inventions of claims 30, 37-42 and 60.

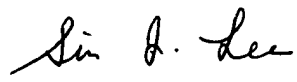
11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sin J. Lee whose telephone number is 571-272-1333. The examiner can normally be reached on Monday-Friday from 9:00 am EST to 5:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia Kelly, can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is **571-273-8300**.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



S. Lee
July 18, 2005


SIN LEE
PRIMARY EXAMINER